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FORMING AND SMOOTHING D_2 AND HD LAYERS FOR ICF BY INFRA-RED HEATING

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We describe a technique to form uniform solid D_2 or HD layers in inertial confinement fusion targets by pumping their collision induced vibration-rotation band. Pumping this absorption band in solid D_2 or HD redistributes the solid with a time constant whose dependence on absorbed power is consistent with calculation. We have observed redistribution rates, (and thus infra-red induced volumetric heat generation rates) in HD up to ten times higher than the volumetric heating that results from the beta-decay in D-T mixtures. Thus the time constant for D-T redistribution enhabced by infrared absorption should decrease from the natural time constant of about 25 minutes to about two-to-three minutes. We can also control the surface roughness of these fusion fuel layers by infra-red heating. Measured and modeled surface roughnesses decrease with increasing infra-red heating. With this technique, we can form solid fuel layers with surface roughness well below the National Ignition Facility specification for ignition targets.

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